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Mexico's Grape Industry:

Table Grapes, Raisins, and Wine

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FOREWORD

Mexico's grape industry is expanding at a rapid rate, spurred by accelerating production of table grape varieties in the northwestern State of Sonora. Growers in this State are increasing shipments of table grapes and raisins to the United States in competition with the marketing of California's crops. Sonora's table grapes, particularly the Thompson Seedless variety, may be processed for raisin or wine production or used for the fresh market, and this has a significant impact on the way in which U.S. growers market their crop.

The purpose of this report is to describe Mexico's grape industry, and the factors underlying its impact on the U.S. grape industry. The author is indebted to members of Mexico's Government and industry for the information and assistance that they provided. Special appreciation is extended to David I. Rosenbloom, Assistant U.S. Agricultural Attaché, Mexico City, Mexico; James H. Baldas, District Director, Animal Plant Health Inspection Service, Plant Protection and Quarantine, Tijuana, Mexico; and Lic. Sergio Miranda Sotelo, Economic Officer, U.S. Consulate, Hermosillo, Mexico, for accompanying the author on his survey and providing information for this report.

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Mexico's Grape Industry:

Table Grapes, Raisins, and Wine

By L. P. Bill Emerson, Jr.

SUMMARY

Mexico's bearing grape area, at 45,000 hectares (110,000 acres) in 1979, is growing dramatically. About a third of this area is in Sonora—the leading producing State, with 15,000 hectares of bearing vineyards plus roughly 5,000 hectares of nonbearing area that will begin yielding fruit in 3 to 5 years. In addition, another 10,000 to 20,000 hectares of grapes are expected to be planted in the State during 1980-85, which will probably double Sonora's output of table grapes, raisins, and wine by the late 1980's.

Table grape production in Sonora during 1978, estimated at 20,000 metric tons, dropped drastically from the previous year's as a result of the absence of the usual cold winter weather necessary for flower formation. Consequently, yields fell from an average of 1,000 boxes[1] per hectare for Thompson Seedless and 850 boxes each for the Perlette and Cardinal varieties to roughly 150 to 250 boxes per hectare for all three varieties.

Nevertheless, indications are that a record crop is in the offing for 1979 because of favorable weather to date and a dramatically larger bearing area. Consequently, Mexico's exports of table grapes to the United States are expected to show a sharp gain from the 5,400 metric tons, valued at $3.4 million, shipped during 1978.

So far, Mexico supplies only 2 to 3 percent of annual U.S. table grape consumption and 20 percent of U.S. imports. However, exports to the United States are expected to accelerate during the 1980's to the point where they may supply 15,000 to 25,000 tons—or more than half of U.S. imports and more than 10 percent of annual domestic consumption.

The U.S. market, on the other hand, already accounts for most of the 25 percent of Sonora's production that moves into export. These shipments are heaviest during June and July, when California's Coachella Valley—the earliest U.S. table grape district—is in peak production.

Raisin output, placed at 3,000 tons in Sonora during 1978, is increasing as growers channel larger quantities of Thompson Seedless table grapes into dried fruit production. Mexico is only a residual supplier of raisins to the United States. However, in late 1978, after a disastrous crop in California, U.S. distributors imported 1,400 tons of the Mexican product, valued at $2.2 million. (Based on U.S. Customs data, rather than USDA marketing order inspections.)

Wine outturn, estimated at 15 million liters (4 million gallons) for all of Mexico in 1978, is rising rapidly as several new wineries begin producing for the growing domestic market. Although Mexico does not export wine, rising output has an indirect impact on the U.S. grape industry inasmuch as Thompson Seedless grapes are often diverted from the fresh export market to local wine output.

INTRODUCTION

During the last 50 years, Mexico's grape production has jumped from 10,000 to 450,000 tons, while the value has climbed from $220,000 to $175 millión. Grape area grew from 1,600 hectares in 1929 to 45,000 bearing hectares in 1979, largely as a result of expanded plantings in the State of Sonora.

[1] *One box equals 10 kilograms or 22 pounds.*

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Along with this production growth has come a shift in emphasis away from the wine production that once dominated toward table grapes and raisins. This change reflects both the movement into new producing areas, such as Sonora State, and changing consumer preferences.

In the past, most of the vineyards were located in regions with excessively warm climates and frequent summer rains, which resulted in poor quality grapes. This, coupled with low acidity and poor coloring qualities of the traditional Mission variety, caused a lack of consumer acceptance for most Mexican wines.

After World War II, grape production moved to better locations and advanced in the States of Aguascalientes, Baja California, and Chihuahua, using improved varieties and better cultural practices. Parallel construction of large wineries with modern fermentation and aging processes led to the production of good quality, standard wines.

During the 1960's, Mexico's first vineyards of table varieties were planted in the desert area of Hermosillo in Sonora State. As grapes were found to do well there and yield good financial returns, growers rapidly enlarged plantings.

The region surrounding the city of Caborca, Sonora, became Mexico's leading raisin district during the 1970's. Some table grapes in the Hermosillo area are also used to make raisins, but untimely rains make sun-drying risky. Therefore, the center for raisin production moved north to Caborca, where rainfall is not a problem and the humidity is lower.

Presently, about $200 million is invested in Mexico's vineyards and $250 million in supporting industrial installations. In addition to a permanent work force of several hundred, there are over 1,000 migrant field workers, whose seasonal (2-month) earnings total about $300,000.

Officials of the Comision Nacional de Fruticultura (CONAFRUT), of the Secretaría de Agricultura y Recursos Hidráulicos (SARH), actively support the expansion of the viticultural industry. CONAFRUT officials and the local grape producer organizations intend to make Hermosillo and Caborca into two of the leading grape districts in North America.

GEOGRAPHY AND CLIMATE

Grape areas in the State of Sonora are concentrated around the cities of Hermosillo and Caborca, about 400 kilometers (250 miles) and 200 kilometers (125 miles), respectively, south of the Arizona border. Soils in these areas of the Sonorian Desert are light sand, with a low sodium content. The climate in Sonora is similar to that in Arizona, except it has a warmer winter.

Although irregular in arriving, rains in Sonora are primarily in July and August, and annual precipitation averages 125-250 millimeters (5-10 inches). Occasionally, the rains come in the spring or fall. Generally, precipitation is in the form of heavy downpours, and the runoff from the nearby Sierra Madre Mountains may cause flash floods, as occurred in October 1978.

Because of the hot, dry weather, Sonora's climate is ideal for table and dessert wine grapes. The mountains of Baja California protect the State from the winter and spring rains that fall on the Pacific Coast. In contrast, Mexico's older vineyards, located in the Central Plateau, suffer from almost constant rainfall during June through September. Moreover, the Baja California crop frequently receives excessive winter rainfall, in addition to not having the cooler weather necessary for producing dormancy in the vines.

Sonora's temperatures fall below freezing during the winter but do not remain low long enough to produce a damaging frost. Winter temperatures fluctuate in a moderate range between -3° and 15°C (26° to 60°F). Daily temperatures in the spring vary widely, ranging from 10°C (50°F) at night to 38°C (100°F) during the day and result in a high sugar-to-acid ratio which produces a better tasting grape.

The conversion of Sonora from a dryland to an irrigated farming area took place as a result of Government water development projects, similar to those in farming districts of California and Arizona. In Hermosillo, the first Government water-development project was the building of the Rodríguez Reservoir, east of the city, during 1946-48.

Prior to this development, farmers depended on the limited waters of the Sonora River to cultivate Hermosillo's coastal zone, La Costa, a deltalike plain extending 70 kilometers (35 miles) inland from the Gulf of California (or, as Mexicans prefer to call it, the Sea of Cortés) at Kino Bay. Farmers flooded fields during the periods of heavy water runoff from the mountains, which was supplemented by sporadic summer rainfall.

The Rodriguez Reservoir was supposed to store enough water from the Sonora River to irrigate 10,000 hectares in the La Costa District. However, as it turned out, the reservoir was only sufficient to meet the water needs of Hermosillo's growing population.

Since the reservoir stopped the flooding of the coastal plains, farmers were forced to drill wells. Then, to repay the large investment necessary for the

wells, many farmers abandoned the traditional crops of corn and wheat in favor of more profitable, year-round crops. At first, cotton was grown, but then farmers discovered that grapes did extremely well in the desertlike climate—and with about half as much water as used for other crops since water and not land—still abundant—is the limiting factor. By producing grapes, Sonora growers were able to double their area.

In the Pesqueira District—a small table grape area 20 kilometers (10 miles) east of Hermosillo—all vineyards are also irrigated by wells from a water table only 20-40 meters (60-130 feet) below the surface. In contrast, the La Costa water table is 100-200 meters (300-600 feet) beneath the fields, and salt water intrusion from the Gulf of Baja may eventually cause severe problems.

Caborca's climate is similar to Hermosillo's, except that it has less rainfall and a lower humidity. Cattle, cotton, olives, and grapes are the leading agricultural products in the area. Most irrigation water comes from deep wells and is found roughly 50-200 meters (150-600 feet) underground. Also, excess water from the Cuauhtemoc Reservoir and the Magdalena River is available for irrigation.

VARIETAL DEVELOPMENT

Not until the twentieth century did Mexican growers switch from the Mission grape, the dominant variety cultivated for 4 centuries, to today's improved varieties of wine, table, and raisin grapes. The Mission grape, developed from European *Vitis vinifera* species, was introduced soon after Hernando Cortés founded the city of Veracruz in 1519. Conquistadores and Jesuit missionaries brought grape seeds and cuttings from Spain and established many small vineyards throughout Mexico.

To produce wine for religious purposes, the Jesuits planted grapes near their missions—hence the name Mission evolved. Unfortunately, the color, sugar content, and other qualities of Mission grapes varied widely from one vineyard to another.

Prior to the introduction of *Vitis vinifera,* the Indians produced wine (or grape juice) from American species, such as *V. berlandieri, V. candicans, V. monticola,* and *V. riparia.* These species produced poor-quality wines but grew best on the alkaline-limestone soils of the Central Plateau, particularly in the northeastern State of Coahuila. Because the American species were well adapted to Mexico's climate, missionaries experimented with the local species as rootstocks and as fruiting stocks to crossbreed with European varieties.

In 1593, Father Francisco de Urdiñola established the first winery (bodega) in Mexico, La Hacienda de Santa María de las Parras, in the north-central plateau. However, in 1685, King Phillip II of Spain prohibited the planting of additional vineyards in order to prevent competition with Spanish wines shipped to the colonies. Although not fully observed, this order did slow the development of Mexico's viticultural industry.

During the seventeenth century, the first true Mission variety was developed (some sources indicate, by crossing Spanish grapes with local American species) in Parras, Coahuila. From Coahuila, the Mission grape was transported north to Baja California and Sonora and south to the central-plateau States.

In the eighteenth and nineteenth centuries, the Mission variety was carried by Franciscan padres from Baja California to California and Aguascalientes, and from Mexico to Peru, Chile, and Argentina.

Vineyards in Baja California and Sonora owe their origins to Father Eusébio Francisco Kino, a legendary Italian-born Jesuit who founded many mission towns in Mexico's Pacific Northwest during the seventeenth century. Under his leadership, cattle ranching and grain farming were begun while Mission grapes were planted to produce wine for religious purposes. Because there were no markets for such poor quality grapes, cattle and grain farming were the dominant agricultural activities in Sonora for three centuries.

In spite of its deficiencies, the Mission variety remained the principal grape grown in Mexico until after the Phylloxera insect began to plague the vineyards in the early twentieth century. At that time, research for Phylloxera-resistant rootstock and other plant varieties was begun. But, it was only after World War II that Mexican officials had the resources to establish a table grape and raisin industry, improve the quality of the wine produced, and convert all Mission grapes to Phylloxera-resistant vineyards. Naturally, the raisin and table grape industries were patterned after those already flourishing north of the border in California and Arizona.

During the 1960's, Sonora became the focal point of Mexico's table grape industry, as vineyards of the Thompson Seedless variety were established. Later, a local raisin industry was started using seedless table varieties, while a sizable wine business was begun primarily based on Caringnane grapes.

Currently, four grape varieties account for over 90 percent of Sonora's vineyards. The leading varieties

are: Thompson Seedless, which is used for table grapes, raisins, wines, and brandies; Caringnane, a Spanish wine grape utilized to make bulk red table wines; Cardinals, an early red, desert table variety that yields large clusters and berries; and, Perlette, the earliest table grape, which has medium-sized clusters and white berries.

Other varieties, in descending order of importance, are: (1) Mission, the traditional sweet, red wine grapes; (2) Palomino, a sherry and white wine variety, originating in the famous sherry district of Spain, Jerez de la Frontera; (3) Ruby Cabernet, a hybrid red, wine grape used primarily for blending with standard wines; (4) Emeral Riesling, a distinctive white wine type from the Rhine and Moselle Valleys of Germany; (5) Black Beauty, a very early, seedless table grape with small berries; (6) Barbera, a red grape used for both blending and producing a distinctive, well-known varietal wine originally from the Piedmont region of Italy; (7) Exotic , a mild-season table variety with large black berries; (8) Grenanche, a rose and port wine grape from Spain; (9) Alicante, a dark-red wine variety used for blending.

Rootstock varieties in Sonora generally need to be resistant to drought, salt accumulation, and Phylloxera. The leading rootstocks are from the very hardy hybrid species, *Berlandieri Rupestris*, which was genetically crossed to produce *Richter 110 (R-110, Ber. Ressequier No. 2 x Rup. Martin)* and *Richter 99 (R-99, Ber. Las Sorres x Rup. de Lot). R-110* and *R-99* have the necessary resistance qualities and good grafting affinity with the fruiting varieties grown in Sonora.

Other important rootstocks found in Sonora are: *Millardet Grasset 41-B (41-B M Chassellas x Ber.)* from the *Vinifera-Berlandieri* cross; and *Courderc 1,613 M (1613-M C, Solonis x Othello (Labrusca-Riparia-Vinifera)* a hybrid of the *Vitis riparia* species.

AREA

Mexico's grape area nearly doubled in the 1960's and then mushroomed from 20,000 to 45,000 bearing hectares between 1970 and 1979. For the 1980's, this rapid expansion will continue, with total area expected to increase twofold.

Mexico's grape regions are in the northern half of the country, in both the Central Plateau and the Pacific Northwest. The Pacific Northwest's vineyards are primarily in the States of Sonora and Baja California; grapes grown in the Central Plateau are concentrated in Coahuila, Aguascalientes, Durango, and Zacatecas.

Until recently, the north-central plateau was the leading grape growing region, with Coahuila having the largest area. However, the Pacific Northwest sharply increased its plantings—during 1970-79 Sonora's area expanded eightfold—and became the focal point of Mexico's viticultural industry.

With the advent of Sonora's vineyards, Mexico's viticultural industry diversified from wine production only toward output of table grapes and raisins also. While Coahuila's grapes are primarily the traditional Mission variety, with new plantings in improved wine varieties, Sonora's vineyards are principally Thompson Seedless.

Presently, Sonora's grape area appears about evenly divided between the Hermosillo and Caborca regions. Hermosillo's La Costa district has roughly 10,000 hectares (25,000 acres), about half of which is in Caringnanes; a fourth in Thompson Seedless; 5 percent in Cardinals; 5 percent in Perlettes; and the remainder in Mission, Palomino, Ruby Cabernet, Emeral Riesling, Black Beauty, Barbera, Exotics, Grenache, and Alicante. Hermosillo's Pesqueira district has a total of about 1,000 hectares (2,500 acres), half of which are Thompson Seedless, and the other half, evenly divided between Cardinals and Perlettes.

Surrounding Caborca, there are many widely scattered vineyards, in areas such as: Llano Blanco, El Deseo, Pitiquito, El Bizani, Enchilallas, and Bajio de la Soledad. The varietal composition of the roughly 11,500 bearing and nonbearing hectares, surrounding Caborca is as follows: Thompson Seedless, 75 percent; Caringnane, 10 percent; Cardinals, 5 percent; Perlettes, 5 percent; and the balance in Mission, Palomino, Black Beauty, and Exotic.

Although Sonora's total area will probably double in size, the lack of additional water will restrict potential expansion. SARH officials have prohibited the drilling of new wells and placed strict limits on the volume of water each existing well may pump. Some grape area enlargements come from the additional water generated from converting from furrow to drip irrigation systems. Most additional plantings will come from areas already irrigated; roughly 20,000 hectares of grain and cotton are programmed by CONAFRUT for conversion to grapes.

YIELD

Yields of all grape varieties rose from an average 6.3 tons per hectare during 1961-65 to 7.5 tons in 1975-79. Output per hectare is generally above the

TABLE GRAPES: PLANTINGS BY AGE AND VARIETY IN THE LA COSTA DISTRICT OF HERMOSILLO, SONORA, MEXICO, DURING 1977

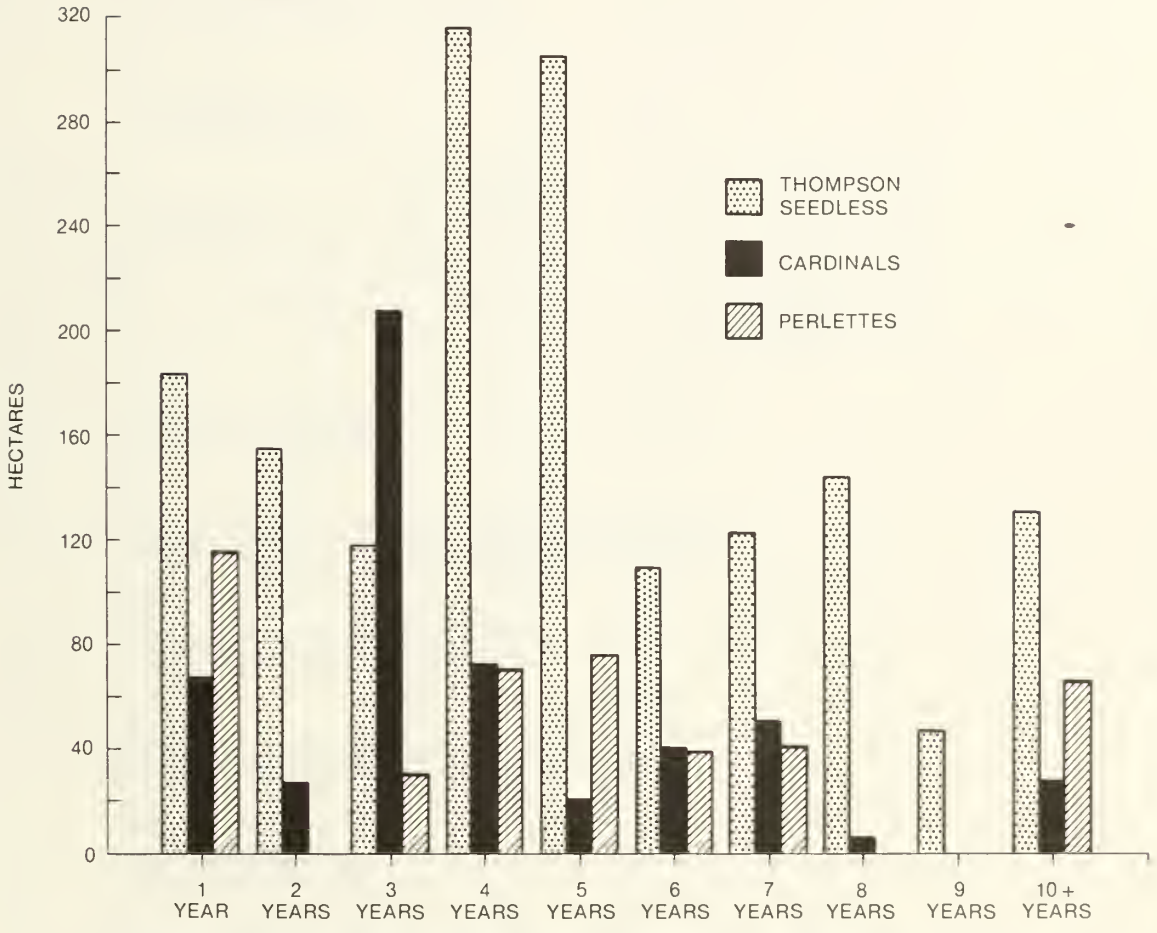

Table grapes are grown intensively in the La Costa district of Hermosillo, Mexico. Roughly half of the production is for export to The United States, while the remainder is shipped to Canada and to the domestic market. This marketing pattern is expected to continue while non-bearing (about 1-3 years old) and beginning-to-bear (about 4-5 years old) plantings start to produce. The last census of grape plantings in the La Costa district was in 1977.

TABLE GRAPES: PLANTINGS BY AGE AND VARIETY IN THE REGION SURROUNDING CABORCA, SONORA, MEXICO, 1960-78

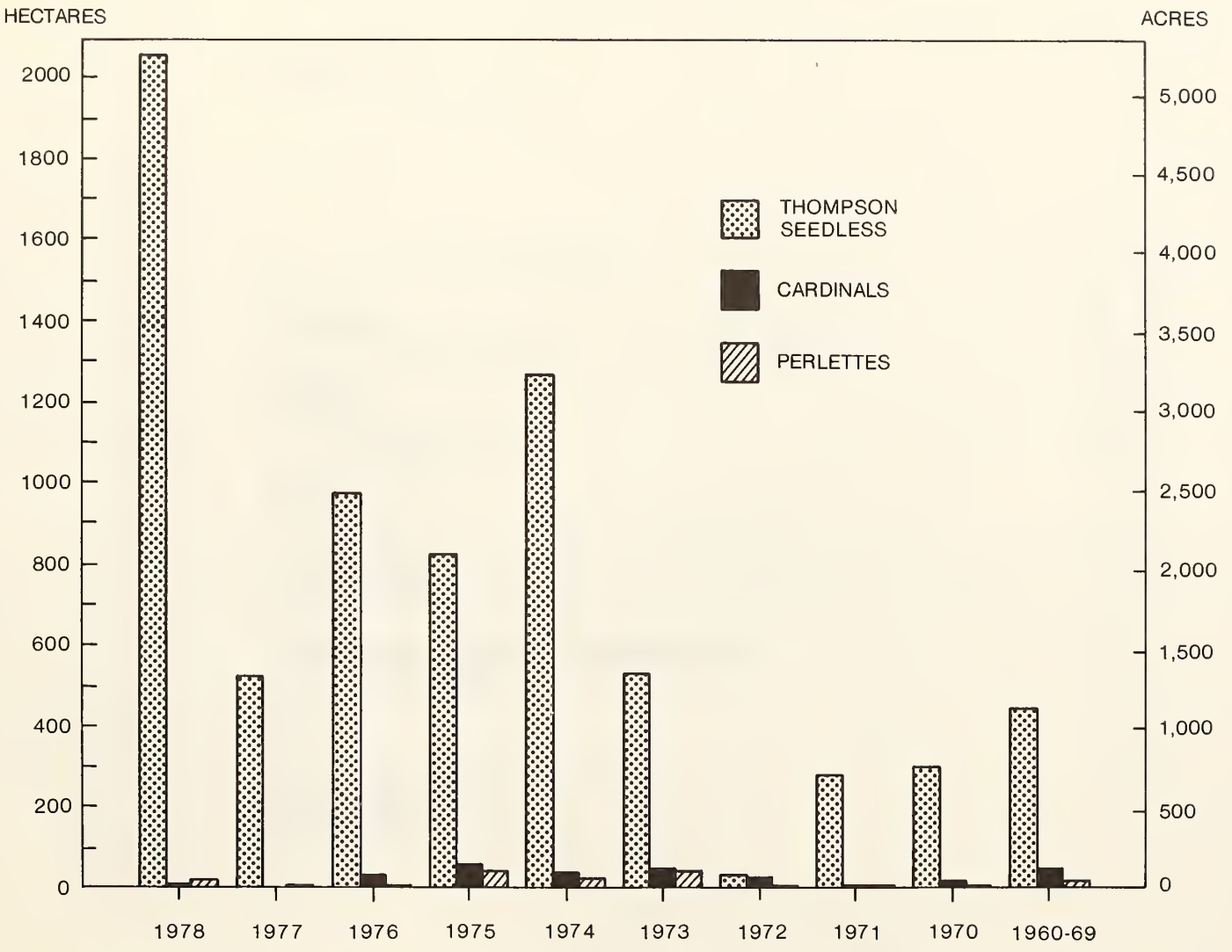

Table grapes are grown extensively around the city of Caborca, Mexico. Roughly half the crop is marketed as table grapes, about a fourth is dried to produce raisins, and the balance is utilized for wine and brandy output. Approximately, half the table grape marketings are exported to the United States while the remainder is shipped to Canada and the domestic market. This marketing pattern will probably continue as nonbearing (about 1-3 years old) and beginning-to-bear (about 4-5 years old) vinyards start to produce. The last census of grape plantings was in February, 1979.

national average in Sonora and Aguascalientes, where grapes are cultivated with modern technology and below average in the older producing areas of Coahuila and Baja California Norte.

Average yields for all varieties in Sonora increased from 6.4 tons per hectare during 1961-65 to 9.4 tons in 1971-75. Adverse weather reduced output to between 6 and 8 tons per hectare in 1977 and 1978.

As more of the newly bearing vineyards mature, Sonora's average yields will advance. The vast majority of Sonora's vineyards are under the peak of production. Eventually, yields are expected to approach those of California, with 15-18 tons per hectare for table grapes, 12-15 tons for wine varieties, and 18-20 tons (before dehydration) for raisin grapes.

PRODUCTION

Inasmuch as water is the essential factor limiting agriculture in Sonora, growers are rapidly changing over to more efficient water usage methods. Almost all crops are irrigated from wells because the limited waters from the Sonora and Magdalena Rivers, and the nearby Rodríguez and Cuauhtémoc Reservoirs, are used by the growing populations of Hermosillo and Caborca.

The traditional furrow, or ditch irrigation, is being replaced by drip irrigation. Though expensive to install, drip systems use less than half the water that ditch irrigation requires.

Generally, vineyards utilizing furrow irrigation have ditches lined with polyethylene to prevent water leakage. The furrow system includes four to six heavy waterings during the season, with numerous light waterings, while drip irrigation is done daily throughout the growing season.

Customarily, fertilizer is applied three times during the year, with the type of fertilizer varying widely from one vineyard to another. The mixture 0-32-15 (0 parts nitrogen, 32 parts phosphate, and 15 parts potash) plus minor nutrients, is the most common fertilizer, particularly on light sandy soils. As a rule, the first application is just before the flowers open, the second is 2 weeks after flower formation, and the third is 2 weeks later.

Phylloxera infestations and desert rats are the two principal pests of grapes in Sonora. Because chemical treatments for Phylloxera have proven to be inadequate, this pest is prevented by resistant rootstocks. Desert rats eat the bark and base of the vines, damaging or killing the plants. Rat traps, poison, and other control methods are used according to the advice of researchers at CONAFRUT and the University of Mexico in Hermosillo.

If other insects become a problem, which is rare in the desert of Sonora, Malathion is sprayed on the vines. Benlate and Captan are used on fungus infestations, which are also unusual in the Sonorian desert.

Plants are usually established in rows 3.6 meters (12 feet) apart and 2 meters (7 feet) from one another within the row. Under this method, about 1,400 vines are planted per hectare. In the old method of planting, vines were set further apart and resulted in 1,000-1,250 vines per hectare.

Most of Sonora's table grapes are raised on horizontal telegraph trellises, although some growers are experimenting with inclined telegraph trellises and overhead trellises of the so-called Argentine style. The majority of the older wine grape plants in Baja California and Coahuila are cultivated on the standard two wires conducted on a bilateral cordon with two wires attached to a post, while newer plantings are primarily on the horizontal telegraph trellis.

Pruning occurs in December, and the method of cutting and training vines varies widely according to plant varieties, the density of the rows, and the area allocated for each plant. Generally, the systems used in California (for example the Guyot, or Medoc methods) are also utilized in Sonora, where vines are head trained and spur, or cane, pruned.

For most table grapes, the predominate pruning-training is a multiple wire, wide-top trellis with canes of equal length from the vine, tied separately to the wires. On mature vines, a new cane, or water sprout that has matured early in the season is cut back to 8 to 15 buds as a fruiting cane for each wire. A renewal cane of two buds length is left, while other canes are completely cut back. At each winter's pruning, the fruit canes that produced the previous season's crop are cut off and replaced by new ones.

Training and pruning of Thompson Seedless grapes used for raisin production are similar to methods used for fruit for the fresh market, except that more buds and canes are retained to produce more fruit. For raisin grapes, a two- or three-wire trellis is used with all the canes tied to the lower wire. This helps to prevent the possibility of sunburn, since the new shoots attach themselves to the upper wires and provide shade to the fruit.

Table grapes are treated with several commonly accepted practices to increase berry size, such as thinning of flower clusters, light girdling, and treatment with Giberelin growth hormone. Flower cluster thinning, which is particularly important for Perlette

grapes, is performed around March 20. Clusters are brush-thinned to obtain about 24 bunches on each vine, to yield a good average size bunch of 0.5 kilograms (1 pound). Giberelin is applied about April 20, and vines are girdled about April 25.

HARVESTING

Earliest harvesting occurs in the Pesqueira District of Hermosillo, spreads to the La Costa district a few days later, and then moves north to Caborca. The first table grape shipments are the Perlette varieties starting about May 20. Then Cardinals begin around June 10, and Thompson Seedless, about June 18. Harvesting is heaviest during late June and July.

Picking and packing get underway as early as 5 a.m. and continue to about noon, when the midday heat terminates the harvesting. While some packers end operations at noon, others bring in another shift for late afternoon packing.

Generally, grapes are placed in large boxes when picked in the vineyards and packed in smaller boxes for shipment to consumers. Grapes are field-packed in wooden boxes. The most common box measures 70 x 40 x 20 centimeters (28 x 16 x 8 inches) and has a capacity of 18-20 kilograms (40-45 pounds) of grapes; smaller boxes with 10-kilogram (22-pound) capacities and dimensions of either 50 x 26 x 16 centimeters (20 x 10 x 6 inches) or 45 x 25 x 18 centimeters are also used.

As a rule, five workers harvest a hectare of grapes during the season, assisted by other workers at the central collection points. Unskilled laborers earn $4 to $6 a day, while skilled workers garner $6 to $10 daily.

PACKING AND PROCESSING

Table grapes. Some growers field pack on tables, while others have Delano-type trailers or large trucks for packing. Grapes packed for export use central packing facilities inside large sheds.

Field-packed grapes are usually selected for quality on tables near the points of collection. Centrally packed fruit is carried to the packinghouse by 10-ton trucks, with boxes stacked seven to eight layers high.

At the packing shed entrance, grapes are checked for sugar content. Packers use a refractometer to determine average sugar content, expressed in degree Brix equivalents. For export, Thompson Seedless must measure at least 16° Brix; Cardinals, 15°; and Perlette, 14.5°. Grapes are then washed and carried to a sorting table where fruit is sorted by hand.

Bunches weighing over 300 grams (10 ounces), with uniformly large-sized berries, are labeled as Select, an export grade. Those weighing 100 to 300 grams (3 to 10 ounces) are labelled as Second grade fruit, which is only sold domestically. When there is no export outlet, packers mix Select and Second grade fruit together to make a First grade quality for the domestic market. Bunches less than 100 grams are sort-outs and used for processing.

Although some table grapes for export are packed in wooden boxes, most are exported in 10-kilogram cardboard boxes, many of them specially made. When either Select or First grade fruit is packed in wooden boxes, it is covered with a white paper packing for protection from mechanical damage. Second grade fruit is placed in wooden boxes without protective packaging.

All grapes destined for export are then taken to precooling plants, while only about half of the fruit for the domestic market goes through precooling plants. In Hermosillo, the La Costa packers use mechanically refrigerated precooling plants, while those in the Pesqueira district have ice bunker cold-storage facilities. In Caborca, both types of plants are available. These same facilities are also used to precool locally important tree fruits, such as peaches, figs, citrus, and pecans.

At the precooling plants, the fruit is placed in refrigerated trucks or trailers. The trucks have a cargo capacity of 18 to 20 tons, but only carry 1,400 to 1,600 boxes (14-16 tons) because 30 percent of the capacity is reserved for the air space required for correct ventilation.

Raisins. Raisins are primarily produced in Caborca, because of the very low rainfall and humidity during the critical drying period. By contrast, Hermosillo is subject to occasional rains from July through September, which can ruin the raisin crop. Consequently, raisins from the Hermosillo area are usually artificially dried, while those from Caborca are sun dried.

Caborca's raisins are harvested in late August and are all from Thompson Seedless grapes. The grapes are laid out on small open paths in the vineyards for sun drying. Special paper is first placed on the ground to protect the grapes during drying. Because of Caborca's very hot and dry climate, the fruit is dehydrated in only 5 days.

Generally, raisins in Hermosillo are dehydrated in 30-ton daily-capacity processing plants. At the plant door, grapes are washed and sorted to eliminate

stems, rotten fruit, and other impurities. After entering the plant, the fruit is: (1) scalded in a 10-percent solution of caustic soda at 32°C (90°F); (2) rinsed with hot water to eliminate the caustic solution; (3) placed in small grating lattices and treated with special charcoal to eliminate impurities (some then being carried in small carts to sulphurization chambers, where an average sulphur concentration of 4 parts per million is absorbed to produce Golden Seedless Raisins); and (4) pulled through dehydration tunnels where currents of hot air (60°C or 160°F) flow contrary to the movement of the carts. This system of dehydration requires 16 to 19 hours.

Once the grapes are dried, either by processing plants or sundrying, the raisins are cleaned and packed in bins of 600 kilograms (1,300 lb). Finally, the packers place the raisins either in bulk containers or cellophane bags or cardboard boxes of any of the following net weights in grams: 90, 100, 180, 250, 454, 500, 907, and 1,000.

It takes 4 to 5 kilograms of grapes to yield 1 kilogram of raisins. During 1977 and 1978, Caborca produced 2,000 tons of raisins annually, while Hermosillo turned out 1,000 tons a year. However, output varies widely from year to year depending on the size and quality of the Thompson Seedless crop and marketing conditions.

Wine. As of 1979 Mexico had 83 wineries with several under construction. National wine production during 1978 was placed at 15 million liters (4 million gallons); while brandy output was 65 million liters (17 million gallons). There are two large wineries in Hermosillo and three in Caborca, one of which produces brandy.

Sonora's wines are predominantly red, processed from the Caringnane variety, while the less important white wines are principally produced from Palomino and Emeral Riesling grapes. Caringnane grapes are blended with other red wine varieties, such as Ruby Cabernet, Barbera, Grenanche, and Alicante. At times, wines based on Palomino and Emeral Riesling grapes are blended with Thompson Seedless and other varieties.

MARKETING

To improve the quality and quantity of Sonora's table grape shipments to the United States, growers recently formed the Asociación Agrícola Local de Productores de Uva de Mesa (Local Agricultural Association of Table Grape Producers). This association is designed to promote production and sales of Sonora's table grapes, assist in the purchasing of supplies, and perform other activities of mutual interest. Both the association and individual growers have marketing arrangements with U.S. table grape associations and importers.

During the 1960's, Hermosillo's growers marketed most of their table grapes in the national market, primarily in Mexico City and Guadalajara. At the time, cooling facilities were quite limited and producers simply picked, packed, and loaded their grapes directly into refrigerated trucks, using these trucks to precool the fruit during the approximately 3-day trip to the market. Arrival quality was acceptable, but prices were generally low.

In 1962, several growers of early table grapes in Hermosillo began to ship to the United States on a regular basis. As they garnered more profits from exports, growers invested in modern refrigeration facilities for proper precooling, which improved quality and U.S. demand for the Mexican product. This, coupled with spectacular area growth, boosted Mexican exports to the United States from only 683 tons in 1968 to 5,400 tons ($3.4 million) in 1978.

Exports to the United States enter through Nogales, Arizona, where they are checked by Animal and Plant Health Inspection Service (APHIS), U.S. Department of Agriculture, for diseases and insects and by the Food and Drug Administration, Department of Health, Education, and Welfare, for wholesomeness and for compliance with U.S. pesticide, labeling, and container regulations. Doors of trucks or railcars shipping to Canada must have a U.S. Customs seal, which may not be broken until arrival in Canada. However, if the shipper finds a U.S. buyer while the shipment is in transit to Canada, the cargo may be sent to the nearest U.S. Customs station where the seal may be broken for U.S. inspection.

Customs inspectors weigh the grapes and assess a duty of 6 cents per cubic foot (roughly 4 cents per 22-pound box) if entered from July 1 to February 14, 5.25 cents per cubic foot from February 15 to March 30, or no duty from April 1 to June 30. Raisins are assessed a duty of 2.2 cents per kilogram (1 cent per pound).

Some shipments are reloaded on railcars in Nogales, while most are trucked to Phoenix for distribution.

During June 1979, exports of Cardinals and Perlettes were priced f.o.b. Arizona at $12 to $16 per 10-kilogram box, while Thompson Seedless went for $10 to $12. Earliest Perlette shipments were valued at $20 to $25 per box and the first Cardinals had

Table Grapes

Clockwise from left: USDA inspectors checking U.S. fruit quality, experimental Mexican plantings of Thompson Seedless grapes; plant nursery with recently grafted Thompson grapes; packing house in Perlette vineyards.

1

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3

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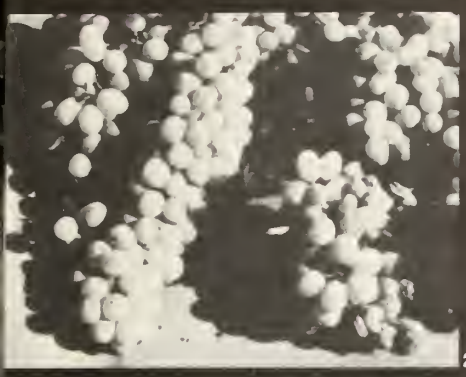
Raisin

s

Clockwise from left: Separating raisins from stems and debris via small grating lattices; sun-drying Thompson Seedless grapes; cleaning raisins with water; sun-drying a bumper crop of Thompson grapes.



2

3

4

Wine

Clockwise from top: Modern winery in Hermosillo; checking vines before winter pruning; a grower shows the pruning-training method for Caringnane grapes on a horizontal telegraph trellis; examining vines damaged by insects and rats.

2

1

3

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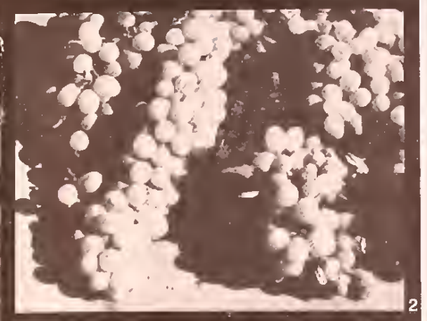
Table Grapes

Clockwise from left: USDA inspectors checking U.S. fruit quality; experimental Mexican plantings of Thompson Seedless grapes; plant nursery with recently grafted Thompson grapes; packing house in Perlette vineyards.

Raisins

Clockwise from left: Separating raisins from stems and debris via small grating lattices; sun-drying Thompson Seedless grapes; cleaning raisins with water; sun-drying a bumper crop of Thompson grapes.



Wine

Clockwise from top: Modern winery in Hermosillo; checking vines before winter pruning; a grower shows the pruning-training method for Caringnane grapes on a horizontal telegraph trellis; examining vines damaged by insects and rats.

seasonal high prices of $15 to $20. These prices averaged $1 to $2 above the previous year's.

Mexico is only a residual supplier of raisins to the U.S. market. However, after California's disastrous 1978 crop, U.S. distributors imported 1,400 tons ($2.2 million) of Mexican raisins during October and November of that year. Because of the limited supply in 1978, U.S. distributors purchased all the available Mexican raisins, and prices rose to $1.60 per kilogram (70 cents per pound). Reportedly, half of these imports were rejected initially because the quality did not comply with the USDA raisin marketing order. Raisins that failed this inspection were reproccssed to eliminate sand and other foreign objects, and then accepted.

Mexican wine output has an indirect impact on the U.S. grape industry since Thompson Seedless grapes are often diverted from the table grape market to wineries when export prices are low. Such diversion reduces U.S. imports of table grapes from Mexico and may displace U.S. wine exports to Mexico's free zone, an area extending 20 kilometers (12 miles) south of the border, as well as the entire Baja California peninsula. U.S. wine shipments to the interior (beyond the free zone) require an import license, which is very difficult to obtain. During 1978, U.S. exports of wine to Mexico totaled 150,000 liters (40,000 gallons) valued at $230,000.

OUTLOOK

Production of table grapes, raisins, and wine is expanding sharply, despite the problems of obtaining industrial inputs. Virtually all farming and packaging materials are either made or controlled by various Government agencies that are often slow to supply. Although Mexico has a high unemployment rate, unionization and rapidly rising minimum wages are inflating production costs and causing some new financial problems.

Sonora's total area will probably double in size, but the lack of additional irrigation water will limit potential expansion. SARH officials have prohibited the drilling of new wells and placed strict limits on the amount of water that each existing well may pump. Consequently, all additional plantings will either come from areas already planted in other crops or from extra water generated by conversion from the furrow method to the water-conserving drip irrigation system.

Nevertheless, CONAFRUT and grape producer organizations are pushing production up at a phenomenal rate. These groups easily gain support for the industry by showing that grape production is both labor-intensive and a foreign-exchange earner.

By promoting the benefits of grape production, growers hope to double the size of the industry during the 1980's. The expanded acreage should support—an advancing table grape industry, for both the export and national markets; a flourishing raisin business, which may ship to the United States when prices are high; and a heightened wine industry for the local market. As growers increase production, the outlook is for rapid expansion in wine and raisin output and table grape exports.

TABLE 1.–HARVESTED AREA, YIELD, AND PRODUCTION OF ALL GRAPE VARIETIES IN MEXICO, BY STATE, 1960-1979

Year	Area Harvested				Yields				Production			
	Baja California		Sonora	Total Mexico[1]	Baja California		Sonora	Average Mexico[1]	Baja California		Sonora	Total Mexico[1]
	Norte	Sur			Norte	Sur			Norte	Sur		
	Hectares				*Metric tons per hectare*				*Metric tons*			
1960	2,800	95	8	10,706	4.5	5.3	6.3	5.9	12,600	500	50	63,349
1961	2,892	98	9	12,176	4.6	5.6	6.8	6.0	13,214	548	61	72,756
1962	2,579	97	8	11,872	4.5	5.7	6.0	5.9	11,686	553	48	70,487
1963	2,797	99	8	13,101	5.1	6.1	6.1	6.2	14,318	600	49	81,650
1964	2,910	101	13	13,370	5.8	5.8	6.4	6.5	16,875	581	83	86,905
1960-64 Average	2,796	98	9	12,245	4.9	5.7	6.3	6.1	13,738	556	58	75,029
1965	2,258	105	265	13,731	5.5	6.0	6.6	7.1	12,419	630	1,756	97,879
1966	1,895	108	327	14,501	5.3	6.2	6.9	7.3	9,949	675	2,248	105,892
1967	1,745	113	439	14,796	5.6	6.6	6.9	6.9	9,816	749	3,018	102,606
1968	1,830	118	489	14,894	5.4	6.9	6.5	7.4	9,836	811	3,178	110,506
1969	2,489	127	1,258	17,160	5.2	6.5	5.8	6.9	13,067	826	7,234	118,158
1965-69 Average	1,723	114	556	15,016	5.4	6.4	6.5	7.1	11,017	738	3,487	107,008
1970	2,724	140	1,967	19,675	6.0	7.6	9.6	9.1	16,344	1,068	18,932	178,467
1971	2,805	182	2,650	21,438	6.1	10.0	9.0	8.5	17,181	1,820	23,903	182,280
1972	2,957	180	3,000	21,469	8.0	10.0	6.4	8.9	23,529	1,800	19,125	190,977
1973	3,000	125	3,000	23,848	7.5	11.2	12.4	9.1	22,401	1,400	37,050	217,619
1974	2,955	125	3,000	25,724	8.3	10.7	10.5	9.2	24,470	1,342	31,416	237,744
1970-74 Average	2,888	150	2,723	22,431	7.2	9.9	9.6	9.0	20,785	1,486	26,085	201,417
1975	2,955	115	3,000	24,537	9.4	10.5	10.7	10.1	27,732	1,210	32,000	247,072
1976	3,793	152	3,500	29,098	7.7	4.1	11.0	9.7	29,317	625	38,500	282,669
1977	3,680	190	6,947	31,929	7.1	2.8	13.6	9.3	26,180	532	94,582	296,604
1978[2]	3,700	350	12,000	40,000	7.0	10.0	8.3	8.8	26,000	3,500	100,000	350,000
1979[3]	3,800	500	15,000	45,000	9.3	10.0	10.9	10.0	35,300	5,000	163,000	450,000
1975-79	3,586	261	8,089	34,113	8.1	7.5	10.9	9.6	28,906	2,173	85,616	325,269

[1] Includes other states. [2] Preliminary. [3] Estimate.

SOURCE: Foreign Agricultural Service. Prepared or estimated on the basis of official statistics of foreign governments, other foreign source materials, reports of U.S. Agricultural Attachés, and Foreign Service Officers, results of office research, and related information.

TABLE 2.–GROWER PRICES AND VALUE OF MEXICO'S GRAPE CROP, INCLUDING ALL VARIETIES, BY STATES, 1960-1979

Year	Grower prices								Value of crop			
	Baja California		Sonora	Average[1]	Baja California		Sonora	Average[1]	Baja California		Sonora	Total[1]
	Norte	Sur			Norte	Sur			Norte	Sur		
	Mexican pesos per kilogram				*U.S. dollars per ton*				*1,000 U.S. dollars*			
1960	1.70	1.60	2.50	1.74	136	128	200	139	1,714	64	10	8,762
1961	1.70	1.64	2.50	1.79	136	131	200	143	1,797	66	12	10,447
1962	1.71	1.72	2.50	1.79	137	138	200	143	1,598	76	10	10,043
1963	1.75	1.68	2.70	1.85	140	134	216	148	2,005	81	11	12,154
1964	1.80	1.72	2.68	1.90	144	138	214	152	2,430	80	18	13,217
1960-64 Average	1.73	1.67	2.58	1.82	138	134	206	145	1,909	73	12	10,925
1965	1.82	1.73	2.10	1.90	146	138	168	152	1,808	87	295	14,867
1966	1.84	1.74	2.15	1.92	147	139	172	154	1,464	94	387	16,250
1967	1.96	2.00	2.25	2.12	157	160	180	170	1,539	120	543	17,409
1968	1.98	1.95	2.25	2.19	158	156	180	175	1,558	127	572	18,546
1969	2.00	1.90	2.35	2.11	160	152	188	169	2,091	125	1,302	19,926
1965-69 Average	1.92	1.86	2.22	2.04	154	149	178	164	1,692	111	620	17,399
1970	2.20	2.00	2.30	2.00	176	160	184	160	2,877	171	3,484	31,370
1971	2.00	2.10	2.15	2.01	160	168	172	168	2,749	306	4,111	29,344
1972	1.40	3.00	1.20	1.41	112	240	96	113	2,635	432	1,836	21,483
1973	2.73	2.00	1.70	1.72	218	160	136	138	4,893	224	5,039	29,960
1974	2.15	3.50	2.66	2.19	172	280	213	175	4,209	376	6,685	41,624
1970-74 Average	2.10	2.52	2.00	1.86	168	202	180	151	3,473	302	4,231	30,756
1975	2.85	3.00	3.00	2.77	228	240	240	222	6,323	290	7,680	54,696
1976	6.25	3.00	3.00	3.16	500	240	240	253	14,659	150	9,240	84,801
1977	6.25	3.88	4.54	4.33	275	171	200	190	7,208	91	18,916	56,588
1978[2]	6.75	4.00	5.00	4.50	297	176	220	198	7,731	617	22,026	69,383
1979[3]	7.00	4.50	6.00	5.00	308	198	264	220	10,885	991	43,084	99,119
1975-79 Average	5.82	3.68	4.31	3.95	321	205	233	217	9,361	428	20,189	72,917

[1] Includes other states. [2] Preliminary. [3] Estimate.

NOTE: Until 1979 season, 12.5 pesos equalled 1 U.S. dollar; during 1977-79, 22.7 pesos equalled 1 dollar.

SOURCE: Foreign Agricultural Service. Prepared or estimated on the basis of official statistics of foreign governments, other foreign source materials, reports of U.S. Agricultural Attachés, and Foreign Service Officers, results of office research, and related information.

TABLE 3.–HARVESTED AREA OF ALL GRAPE VARIETIES IN MEXICO, BY STATE, 1961-79

[In hectares]

Year	Aguas-calientes	Baja California		Chihuahua	Coahuila	Durango	Guanajuato	Queretaro	Sonora	Zacatecas	Other[1]	Total
		Norte	Sur									
1961	2,590	2,892	98	1,242	4,462	481	108	181	9	34	79	12,176
1962	3,290	2,579	97	1,153	3,951	481	119	93	8	32	69	11,872
1963	3,760	2,797	99	1,137	4,084	762	124	225	8	39	66	13,101
1964	3,860	2,910	101	1,142	4,050	775	130	274	13	41	74	13,370
1965	2,709	2,258	105	1,346	4,334	1,375	138	1,089	265	44	68	13,731
1966	2,877	1,895	108	1,449	4,438	1,897	149	1,251	327	47	63	14,501
1967	3,050	1,745	113	1,496	4,515	2,031	153	1,153	439	48	53	14,796
1968	3,175	1,830	118	1,575	4,565	1,925	128	985	489	53	51	14,894
1969	4,320	2,489	127	851	4,595	2,226	170	1,024	1,258	58	42	17,160
1970	5,150	2,724	140	1,000	4,945	1,893	175	850	1,967	750	81	19,675
1971	5,500	2,805	182	1,060	5,059	1,827	784	750	2,650	650	171	21,438
1972	5,400	2,957	180	1,179	4,284	1,848	800	1,000	3,000	600	221	21,469
1973	6,100	3,000	125	1,000	4,500	1,943	1,000	1,800	3,000	1,130	250	23,848
1974	7,500	2,955	125	714	4,511	1,952	750	2,300	3,000	1,747	170	25,724
1975	6,200	2,955	115	493	4,061	1,869	890	2,300	3,000	2,565	89	24,537
1976	8,800	3,793	152	547	5,225	1,844	890	1,550	3,500	2,569	232	29,098
1977	9,000	3,680	190	790	4,424	1,978	550	1,081	6,947	3,000	289	31,929
1978[2]	9,000	3,700	350	900	6,000	3,000	770	1,000	12,000	3,000	280	40,000
1979[3]	9,000	3,800	500	1,000	6,500	4,000	1,000	1,000	15,000	3,000	200	45,000

[1] Includes District Federal, Hidalgo, Jalisco, Nuevo Leon, Puebla, and San Luis Potosi. [2] Preliminary. [3] Estimate.

SOURCE: Foreign Agricultural Service. Prepared or estimated on the basis of official statistics of foreign governments, other foreign source materials, reports of U.S. Agricultural Attachés and foreign service officers, results of office research, and related information.

TABLE 4.–AVERAGE YIELDS OF ALL GRAPE VARIETIES IN MEXICO, BY STATE, 1961-79

[In metric tons per hectare]

Year	Aguas-calientes	Baja California		Chihuahua	Coahuila	Durango	Guanajuato	Queretaro	Sonora	Zacatecas	Other[1]	Total
		Norte	Sur									
1961	6.7	4.6	5.6	5.9	6.5	6.7	5.4	5.3	6.8	6.3	5.0	6.0
1962	6.8	4.5	5.7	5.9	6.1	6.6	5.2	5.5	6.0	6.3	4.6	5.9
1963	6.8	5.1	6.1	6.3	6.5	6.2	5.8	5.5	6.1	6.4	5.0	6.2
1964	7.1	5.8	5.8	6.1	6.6	6.3	6.0	6.5	6.4	6.5	5.6	6.5
1965	10.1	5.5	6.0	6.4	6.9	6.5	6.3	6.2	6.6	6.8	5.4	7.1
1966	10.4	5.3	6.2	6.6	7.1	6.8	6.5	6.0	6.9	7.0	5.4	7.3
1967	8.8	5.6	6.6	6.4	6.9	6.3	6.1	6.5	6.9	6.8	5.8	6.9
1968	10.6	5.4	6.9	6.0	7.1	6.5	6.2	6.9	6.5	7.2	6.0	7.4
1969	10.0	5.2	6.5	5.6	4.9	7.2	4.1	9.0	5.8	7.0	4.3	6.9
1970	12.0	6.0	7.6	9.0	8.5	8.4	10.0	7.0	9.6	7.0	6.0	9.1
1971	10.0	6.1	10.0	7.9	8.5	6.0	8.0	10.0	9.0	10.5	8.3	8.5
1972	10.1	8.0	10.0	9.8	8.4	7.9	10.0	13.0	6.4	11.7	9.1	8.9
1973	8.5	7.5	11.2	8.0	9.0	7.3	7.0	8.5	12.4	16.5	5.5	9.1
1974	10.0	8.3	10.7	14.0	6.6	6.6	10.5	10.0	10.5	12.0	6.7	9.2
1975	9.8	9.4	10.5	14.1	8.6	8.7	8.7	10.2	10.7	13.9	5.3	10.1
1976	8.0	7.7	4.1	9.2	10.6	9.7	7.0	12.1	11.0	15.0	8.2	9.7
1977	8.0	7.1	2.8	6.2	6.7	6.6	7.5	14.3	13.6	11.3	8.6	9.3
1978[2]	7.8	7.0	10.0	13.2	6.9	9.8	11.3	11.9	8.3	15.0	7.5	8.8
1979[3]	9.0	9.3	10.0	13.2	7.4	9.0	10.0	10.9	10.9	15.0	10.5	10.0

[1]Includes District Federal, Hidalgo, Jalisco, Nuevo Leon, Puebla, and San Luis Potosi. [2]Preliminary. [3]Estimate.

SOURCE: Foreign Agricultural Service. Prepared or estimated on the basis of official statistics of foreign governments, other foreign source materials, reports of U.S. Agricultural Attachés and foreign service officers, results of office research, and related information.

TABLE 5.–PRODUCTION OF ALL GRAPE VARIETIES IN MEXICO, BY STATE, 1961-79

[In metric tons]

Year	Aguas-calientes	Baja California		Chihuahua	Coahuila	Durango	Guanajuato	Queretaro	Sonora	Zacatecas	Other[1]	Total
		Norte	Sur									
1961.	17,369	13,214	548	7,327	28,878	3,217	579	953	61	213	397	72,756
1962.	22,377	11,686	553	6,797	24,220	3,158	624	508	48	202	314	70,487
1963.	25,743	14,318	600	7,112	26,603	4,690	714	1,239	49	249	333	81,650
1964.	27,543	16,875	581	6,995	26,731	4,844	780	1,794	83	266	413	86,905
1965.	27,429	12,419	630	8,581	29,796	8,938	863	6,806	1,756	297	364	97,879
1966.	29,849	9,949	675	9,600	31,621	12,805	969	7,506	2,248	329	341	105,892
1967.	26,688	9,816	749	9,537	31,041	12,694	937	7,495	3,018	324	307	102,606
1968.	33,734	9,836	811	9,647	32,526	12,513	800	6,772	3,178	384	305	110,506
1969.	43,200	13,067	826	4,787	22,401	16,138	701	9,216	7,234	406	182	118,158
1970.	61,800	16,344	1,068	9,000	42,032	15,854	1,750	5,950	18,932	5,250	487	178,467
1971.	55,000	17,181	1,820	8,374	43,002	10,962	6,272	7,500	23,903	6,855	1,411	182,280
1972.	54,432	23,529	1,800	11,582	35,934	14,553	8,000	13,000	19,125	7,000	2,022	190,977
1973.	51,850	22,401	1,400	8,000	40,500	14,093	7,000	15,300	37,050	18,645	1,380	217,619
1974.	75,000	24,470	1,342	9,996	29,741	12,800	7,875	23,000	31,416	20,964	1,140	237,744
1975.	60,700	27,732	1,210	6,962	34,828	16,252	7,742	23,500	32,000	35,675	471	247,072
1976.	70,400	29,317	625	5,046	55,513	17,858	6,230	18,804	38,500	38,475	1,901	282,669
1977.	72,000	26,180	532	4,890	29,563	12,975	4,125	15,500	94,582	33,767	2,490	296,604
1978[2]	70,200	26,000	3,500	11,900	41,200	29,500	8,700	11,900	100,000	45,000	2,100	350,000
1979[3]	81,200	35,300	5,000	13,200	48,300	36,000	10,000	10,900	163,000	45,000	2,100	450,000

[1]Includes District Federal, Hidalgo, Jalisco, Nuevo Leon, Puebla, and San Luis Potosi. [2]Preliminary. [3]Estimate.

SOURCE: Foreign Agricultural Service. Prepared or estimated on the basis of official statistics of foreign governments, other foreign source materials, reports of U.S. Agricultural Attachés and foreign service officers, results of office research, and related information.

TABLE 6.–AVERAGE GROWER PRICES FOR ALL GRAPE VARIETIES IN MEXICO, BY STATE, 1961-79

[In pesos per kilogram]

Year	Aguas-calientes	Baja California		Chihuahua	Coahuila	Durango	Guanajuato	Queretaro	Sonora	Zacatactas	National Average
		Norte	Sur								
1961	1.87	1.70	1.64	1.80	1.76	1.86	2.00	2.33	2.50	1.95	1.79
1962	1.76	1.71	1.72	1.93	1.78	1.95	1.97	2.50	2.50	2.04	1.79
1963	1.95	1.75	1.68	1.85	1.80	1.90	2.05	2.37	2.70	1.98	1.85
1964	1.98	1.80	1.72	1.87	1.85	1.92	2.07	2.35	2.68	2.05	1.90
1965	1.95	1.82	1.73	1.87	1.85	1.90	2.10	2.00	2.10	2.08	1.90
1966	1.96	1.84	1.74	1.88	1.86	1.92	2.12	2.05	2.15	2.10	1.92
1967	2.15	1.96	2.00	2.15	2.00	2.13	2.14	2.20	2.25	2.17	2.12
1968	2.20	1.98	1.95	1.95	2.05	2.04	2.20	2.23	2.25	2.24	2.19
1969	2.25	2.00	1.90	1.90	1.95	1.95	2.25	2.25	2.35	2.30	2.11
1970	2.30	2.20	2.00	2.00	2.10	1.95	2.30	2.30	2.30	2.35	2.00
1971	1.90	2.00	2.10	2.05	1.90	2.00	2.40	2.30	2.15	2.40	2.01
1972	1.20	1.40	3.00	1.20	1.40	1.40	1.75	2.00	1.20	1.84	1.41
1973	1.30	2.73	2.00	1.20	1.40	1.45	2.10	2.50	1.70	2.00	1.72
1974	2.00	2.15	3.50	1.88	2.28	2.25	2.50	2.50	2.66	1.75	2.19
1975	2.85	2.85	3.00	1.80	2.84	2.50	3.00	2.80	3.00	2.50	2.77
1976	2.50	6.25	3.00	2.30	2.57	2.55	4.30	2.5	3.00	3.60	3.16
1977	3.30	6.25	3.88	3.00	7.00	3.60	3.00	3.45	4.54	3.15	4.33
1978[1]	4.00	6.75	4.00	3.50	5.00	3.50	3.25	3.75	5.00	3.50	4.50
1979[2]	5.00	7.00	4.50	4.50	6.00	4.00	3.50	4.25	6.00	4.00	5.00

[1]Preliminary. [2]Estimate.

SOURCE: Foreign Agricultural Service. Prepared or estimated on the basis of official statistics of foreign governments, other foreign source materials, reports of U.S. Agricultural Attachés and foreign service officers, results of office research, and related information.

TABLE 7.–U.S. SUPPLY AND DISTRIBUTION OF TABLE GRAPES, 1965/66 TO 1978/79

Crop year beginning June 1	Supply						Distribution				Imports as a percent of Production	Exports as a percent of Production
	Production[1]	Imports				Total	Exports		Consumption (apparent)	Total		
		Chile	Mexico	Canada	Total[2]		Canada	Total[3]				
	Metric tons										*Percent*	
1965/66	543,930	6,471	345	8,345	17,129	561,059	97,925	119,333	441,726	561,059	3	22
1966/67	541,912	4,678	496	6,832	12,992	554,904	86,439	114,152	440,752	554,904	2	21
1967/68	423,433	7,651	530	10,611	20,751	444,184	90,436	102,627	341,557	444,184	5	24
1968/69	506,184	9,568	683	3,501	14,868	521,052	93,220	108,126	412,926	521,052	3	21
1969/70	509,809	5,822	595	8,326	15,814	525,623	108,836	129,367	396,256	525,623	3	25
1970/71	353,811	11,031	783	6,071	18,395	372,206	89,162	103,207	268,999	372,206	5	29
1971/72	356,210	9,682	978	1,077	12,571	368,781	115,984	126,403	242,378	368,781	4	35
1972/73	325,306	5,000	2,215	385	8,266	333,572	81,763	96,819	236,753	333,572	3	30
1973/74	368,144	8,092	3,127	739	12,614	380,758	82,557	102,419	278,339	380,758	3	28
1974/75	394,167	14,362	1,683	3,338	20,390	414,557	86,750	106,634	307,923	414,557	5	27
1975/76	451,955	16,764	3,087	40	20,291	472,246	87,589	112,801	359,445	472,246	4	25
1976/77	423,052	19,589	4,848	1,069	25,538	448,590	81,574	97,765	350,825	448,590	6	23
1977/78	436,678	22,761	6,662	3,917	33,365	470,043	85,367	109,126	360,917	470,043	8	25
1978/79	386,691	30,622	5,613	2,024	38,509	425,200	72,347	95,892	329,308	425,200	10	25

[1] Production includes only table grapes shipped for the fresh market and not utilized for processing. [2] Includes other imports. [3] Includes other exports.

SOURCE: Production, Crop Reporting Board, USDA; Imports and exports compiled from reports of the Bureau of Census, U.S. Department of Commerce.

TABLE 8.–U.S. EXPORTS OF FRESH GRAPES, 1972/73 TO 1977/78

[In metric tons]

Country of destination	Year beginning June 1						
	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79
Europe:							
Denmark	179	286	117	282	30	234	92
Finland	285	205	248	372	73	399	215
Germany, Fed. Rep	0	115	124	130	47	570	386
Ireland	44	74	54	159	0	59	85
Italy	0	0	0	0	254	0	0
Netherlands	199	273	385	942	120	1,271	867
Norway	687	619	105	586	149	533	692
Sweden	1,798	2,016	1,419	1,926	839	1,854	1,738
United Kingdom	1,255	1,330	1,235	1,924	94	1,006	628
Other	2	8	6	16	6	35	56
Total	4,449	4,926	3,693	6,337	1,612	5,961	4,759
Latin America:							
Belize	4	19	42	36	12	9	18
Brazil	15	121	60	68	0	40	0
Costa Rica	48	88	14	92	155	173	297
Ecuador	60	50	50	33	29	63	54
El Salvador	0	33	7	152	130	161	344
Guatemala	548	361	608	529	740	991	1,117
Honduras	52	130	171	168	300	492	372
Mexico	213	236	402	607	207	478	366
Nicaragua	81	90	171	196	194	209	83
Panama	426	559	684	754	615	876	960
Venezuela	2,093	1,661	1,530	760	690	722	540
Other	11	2	2	6	1	5	32
Total	3,551	3,350	3,741	3,401	3,073	4,219	4,183
Bermuda and Caribbean:							
Bahamas	71	66	85	117	92	82	76
Bermuda	29	29	23	23	48	71	56
Dominican Republic	75	188	106	714	444	438	381
French West Indies	0	4	0	58	27	17	47
Haiti	17	6	6	10	8	23	22
Jamaica	85	10	6	0	0	0	0
Netherland Antilles	71	96	127	122	101	169	148
Trinidad & Tobago	500	127	159	260	204	269	225
Other	10	11	1	4	4	10	3
Total	858	537	513	1,308	928	1,079	958
Other countries:							
Canada	81,763	82,557	86,750	87,589	81,574	85,367	72,347
China (Taiwan)	0	9	61	862	188	390	442
French Pacific Islands	89	106	114	124	81	93	46
Hong Kong	4,530	7,108	7,343	5,936	5,538	6,369	5,442
Indonesia	163	488	841	1,733	1,824	1,667	1,188
Japan	213	729	767	1,943	845	1,414	2,842
Malaysia	24	41	12	50	94	28	137
New Zealand	256	338	460	431	394	376	393
Other Pacific Islands	10	45	32	73	71	50	79
Philippines	43	141	77	93	63	87	149
Singapore	850	2,008	2,211	2,918	1,365	1,991	2,237
Thailand	9	1	13	0	85	0	8
Other	11	35	6	3	30	35	682
Total	87,961	93,606	98,687	101,755	92,152	97,867	85,992
Grand total	96,819	102,419	106,634	112,801	97,765	109,126	95,892

SOURCE: Bureau of the Census, U.S. Department of Commerce.

TABLE 9.–U.S. IMPORTS OF FRESH GRAPES, 1972/73 TO 1977/78

[In metric tons]

Country of origin	Year beginning June 1						
	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79
Argentina	13	0	0	113	0	0	0
Canada	385	739	3,338	40	1,069	3,917	2,024
Chile	5,000	8,092	14,362	16,764	19,589	22,761	30,622
Mexico	2,215	3,127	1,683	3,087	4,848	6,662	5,613
South Africa	261	656	973	287	0	0	250
Spain	392	0	0	0	0	0	0
Other	0	0	34	0	32	25	0
Grand total	8,266	12,614	20,390	20,291	25,538	33,365	38,509

SOURCE: Bureau of the Census, U.S. Department of Commerce.

TABLE 10.–RAISINS AND CURRANTS: EXPORTS FROM UNITED STATES MARKETING YEARS 1974/75-1978/79

[In metric tons]

Country of destination	Year beginning September 1				
	1974/75	1975/76	1976/77	1977/78	1978/79[1]
Europe:					
European Community:					
Belgium-Luxembourg	657	1,124	742	1,424	268
Denmark	1,785	2,533	1,966	2,374	621
France	465	407	152	734	72
Germany, Fed. Rep.	3,049	2,489	1,444	3,372	996
Ireland	437	125	38	51	17
Italy	47	0	5	0	153
Netherlands	1,482	2,186	1,074	2,050	460
United Kingdom	6,697	7,859	2,599	2,394	315
Total	14,619	16,723	8,020	12,399	2,902
Other Europe:					
Austria	43	37	17	92	12
Finland	2,058	3,096	2,665	2,113	989
Iceland	109	188	40	151	33
Norway	1,059	2,178	1,094	1,684	418
Spain	46	43	28	26	0
Sweden	2,812	3,772	2,759	3,162	1,805
Switzerland	618	838	640	797	358
Other	20	13	5	4	0
Total	6,765	10,165	7,248	8,029	3,615
Total Europe	21,384	26,888	15,268	20,428	6,517

See footnote at end of table.

Continued

TABLE 10.–RAISINS AND CURRANTS: EXPORTS FROM UNITED STATES MARKETING YEARS 1974/75-1978/79–Cont'd.

[In metric tons]

Country of destination	Year beginning September 1				
	1974/75	1975/76	1976/77	1977/78	1978/79[1]
Latin America:					
Bolivia	5	1	13	22	3
Brazil	794	159	1	224	51
Colombia	41	16	110	235	45
Costa Rica	15	21	13	27	7
Ecuador	106	109	77	140	47
El Salvador	14	12	26	16	12
Guatemala	25	50	45	64	83
Honduras	16	31	8	39	22
Mexico	168	388	59	131	307
Nicaragua	16	29	21	36	3
Panama	99	176	97	185	34
Venezuela	562	985	791	1,291	395
Other	14	41	8	49	7
Total	1,875	2,018	1,269	2,459	1,016
Bermuda & Caribbean:					
Bahamas	60	64	42	62	20
Bermuda	58	59	98	41	44
Dominican Republic	105	125	81	100	19
Jamaica	85	53	9	2	4
Netherlands Antilles	57	67	58	81	71
Trinidad & Tobago	134	42	19	43	9
Other	16	10	12	49	19
Total	515	420	319	378	186
Other Countries:					
Canada	7,218	8,660	6,141	7,208	2,047
China (Taiwan)	704	1,432	236	1,280	148
French Pacific Islands	110	13	16	21	6
Hong Kong	480	458	163	400	49
Japan	15,978	21,574	11,483	16,917	3,335
Korea, Republic of	95	267	86	266	60
Malaysia	228	298	226	350	78
New Zealand	847	1,481	594	873	161
Philippines	145	184	60	111	29
Singapore	510	902	259	464	143
Soviet Union	0	0	0	1,486	0
Thailand	16	91	151	[2] 142	14
Other	105	189	184	[2] 454	34
Total	26,436	35,549	19,599	29,972	6,104
Grand total	50,210	64,875	36,455	53,237	13,823

[1] September-March only. [2] Includes 194 metric tons to India.

SOURCE: Bureau of the Census, U.S. Department of Commerce.

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